PHYSICS

BOOKS - NTA MOCK TESTS

NEET MOCK TEST 9

Physics

1. Consider the following statements and state whether true (T) or false (F) :

(i) Nuclear fission is normaly followed by

emission of β^- - particles.

(ii)Emission of $\alpha-$ particle is normally followed by emission of $\gamma-$ rays

(iii) As the mass number A increases, the binding energy per nucleon in a nucleus also increaes

Choose the correct order from the options given below

A. T T T

B. T T F

C. F T T

D. T F T

Answer: B

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2. The electrical conductivity of semicondutor increases when electromagnetic radiation of wavelength shorter than 24800Å is incident on it. The band gap for the semiconductor is

A. 0.9ev

B. 0.7 Ev

C. 0.5 eV

D. 1.1 eV

Answer: C

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3. A freshly prepared radioactive source of half-life $2h$ emits radiation of intensity which is 64 times the permissible safe level. The

minimum time after which it would be possible to work safely with this source is

A. 6h

B. 12h

C. 24h

D. 128h

Answer: B

4. A photon of energy 10.2eV collides inelastically with a stationary hydrogen atom in the ground state. After a time interval of the order of a microsecond, another photon collides with energy of 15eV. What will be observed by the detector ?

A. one photon of energy 10.2 eV and an electron having energy 1.4 eV

B. two photons of energy 1.4 eV

C. two photons of energy 10.2 eV

D. one photon of energy 10.2 eV and another photon of 1.4eV

Answer: A

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5. The square root of the product of inductance and capacitance has the dimension of

A. length

B. mass

C. time

D. frequency

Answer: C

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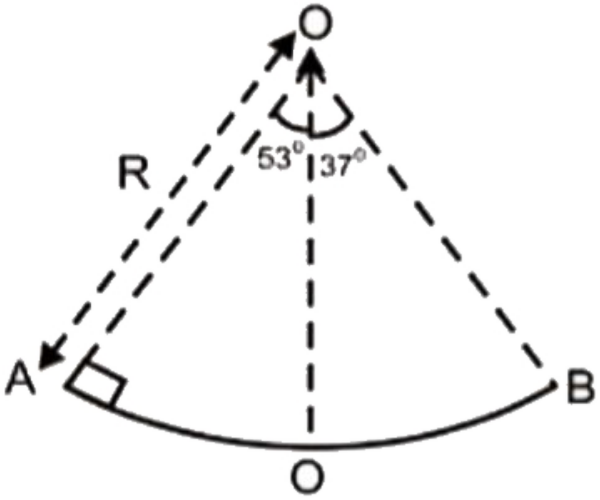
6. In a fixed quarter circular track of radius R which lies in a vertical plane, a block is released from point A and it leaves the path at point B. The radius of curvature of its

trajectory when it just leaves the path will be



A. R

B. $\frac{R}{4}$

C. $\frac{R}{2}$

D. None of these

Answer: C

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7. For a diamagnetic substance, susceptibility is

A. small and positive

B. small and negative

C. large and positive

D. large and negative

Answer: B

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8. The potentiometer wire is of length 1200 cam and it carries a current of 60 mA. For a cell of emf 5V and internal resistance of 20Ω, the null point of it is found to be at 1000 cm.The resistance of potentiometer wire is

A. 60Ω

B. 120Ω

C. 100Ω

D. 80Ω

Answer: C

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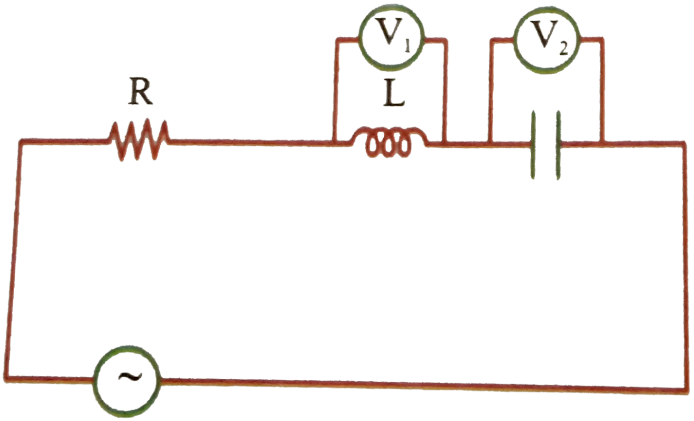
9. In the figure shown $R = 100\Omega$, $L = \frac{2}{\pi}H$ and $C = \frac{8}{\pi}\mu F$ are connected in series with a.c source of 200 volt and frequency $'f'$. V_1 and V_2 are two hot-wire voltmeters. If the

readings of V_1 and V_2 are same then:



A. f =125 Hz

B. f =250π Hz

C. current through R is 2A

D. $V_1 = V_2 = 1000$ volt

Answer: B

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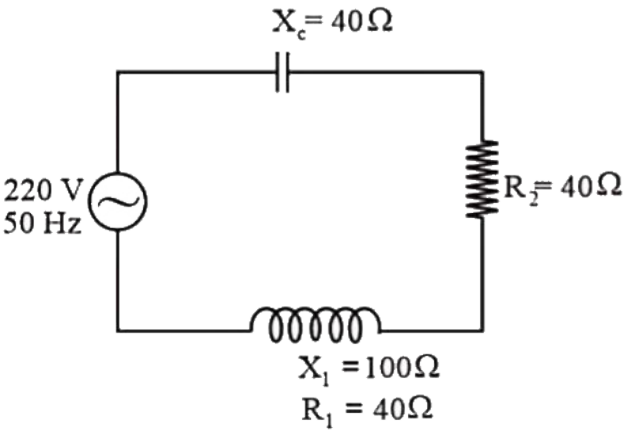
10. Calculate the power factor of the circuit shown in figure



A. 0.2

B. 0.4

C. 0.8

D. 0.6

Answer: C

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11. If the radius of the earth becomes half of its present value (mass remaining the same), the new length of the day would be

A. 6 hours

B. 12 hours

C. 48 hours

D. 96 hours

Answer: A

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12. A diatomic gas is used in car not heat engine having efficiency 80% . Find the ratio of initial volume to final volume of gas during adiabatic expansion.

A. $\left(\frac{1}{5}\right)^{\frac{3}{2}}$

B. $\left(\frac{1}{3}\right)^{\frac{5}{2}}$

C. $\left(\frac{1}{5}\right)^{\frac{5}{2}}$

D. $\left(\frac{1}{5}\right)^{\frac{2}{5}}$

Answer: C

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13. A steel ball strikes a fixed smooth steel plate placed on a horizontal surface atan

angle θ with the vertical. If the coefficient of restitution is e, the angle at which the rebound will take place is:

A. θ

B. $\tan^{-1}\left[\frac{\tan\theta}{e}\right]$

C. $e\tan\theta$

D. $\tan^{-1}\left[\frac{e}{\tan\theta}\right]$

Answer: B

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14. A particle A of charge $1\mu C$ is held fixed at a point P in free space . Another particle B of same charge and mass $4\mu g$ is kept at a distance of 1mm from P. If B is released then its velocity at a distance of 9 mm from P is (Take $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9 Nm^2C^{-2}$)

A. $1.5 \times 10^2 m/s$

B. $1.0 m/s$

C. $3.0 \times 10^4 m/s$

D. $2.0 \times 10^3 m/s$

Answer: D

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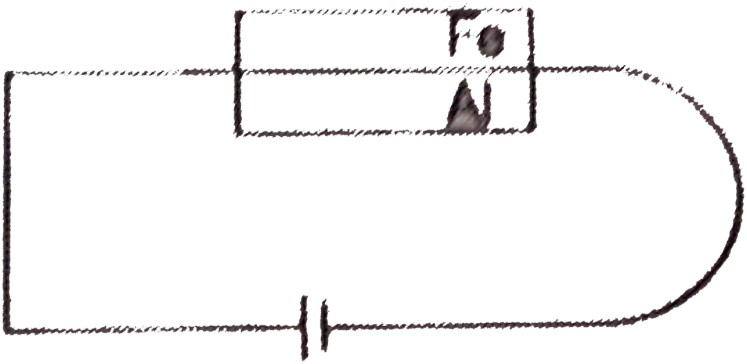
15. A plate composed of welded sheets of aluminium and iron is connected to an electrical circuit as shown in figure. What will happen if a fairly strong current to be passed

through the circuit?



A. strip bends upward

B. strip bends downward

C. strip remains in its initial condition

D. none of the above

Answer: A

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16. If the radius of a sphere is measured to be (2.1 ± 0.05)cm.Calculate the surface area (in cm^2)

A. 54.45 ± 2.46

B. 55.44 ± 2.64

C. 52.03 ± 4.26

D. 45.54 ± 2.68

Answer: B

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17. A point P lies on the axis of a flat coil carryinga current. The mangetc moment of the coil is μ. What will be the magnetic field at point P ? It is given that the distance of P from the centre of coil is d, which is large compared to the radius of the coil.

A. $\frac{\mu_0}{2\pi}\left(\frac{\mu}{d^3}\right)$

B. $\frac{\mu_0}{4\pi}\left(\frac{\mu}{d^3}\right)$

C. $\frac{\mu_0}{6\pi}\left(\frac{\mu}{d^2}\right)$

D. $\frac{\mu_0}{8\pi}\left(\frac{\mu}{d^2}\right)$

Answer: A

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18. An amount of heat 50J of heat energy is removed from 4 moles of a monatomic ideal gas at constant volume.The temperature drops by

A. $40^\circ C$

B. $30^\circ C$

C. $10^\circ C$

D. $0^\circ C$

Answer: C

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19. Two small satellites are moving in circular orbits around the earth at a distance R and $R + \Delta R$ from the centre of the earth. If their

time period of rotation are T and $T + \Delta T$ respectively, then

A. $\Delta T = T\frac{\Delta R}{R}$

B. $\Delta T = 3T\frac{\Delta R}{R}$

C. $\Delta T = \frac{3}{2}T\frac{\Delta R}{R}$

D. $\Delta T = \frac{2}{3}T\frac{\Delta R}{R}$

Answer: C

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20. A solid sphere of copper of radius R and a hollow sphere of the same material of inner radius r and outer radius R are heated to the same temperature and allowed to cool in the same environment. Which of them starts cooling faster?

A. hollow sphere

B. solid sphere

C. at equal time

D. none of these

Answer: A

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21. Choose the intensive property from the options given below

A. volume

B. mass

C. refractive index

D. weight

Answer: C

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22. A uniform rod AB of mass m and length l is at rest on a smooth horizontal surface. An impulse J is applied to the end B, perpendicular to the rod in the horizontal direction. Speed of particlem P at a distance $\frac{l}{6}$ from the centre towards A of the rod after time $t = \frac{\pi ml}{12J}$ is.

A. $2\frac{J}{m}$

B. $\frac{J}{\sqrt{2}m}$

C. $\frac{J}{m}$

D. $\sqrt{2}\frac{J}{m}$

Answer: D

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23. If the temperature of the sink of a Carnot engine having an efficiency $\frac{1}{6}$ is reduced by $62^{\circ}C$, then its efficiency is doubled. Find the

temperature of the sink and source respectively.

A. $124^\circ C, 62^\circ C$

B. $99^\circ C, 37^\circ C$

C. $37^\circ C, 99^\circ C$

D. $62^\circ C, 124^\circ C$

Answer: C

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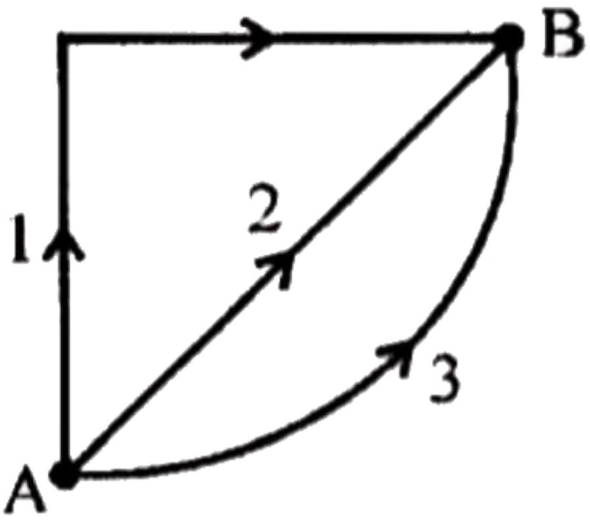
24. The work done in moving a particle in the gravitational field of earth from point A to point B along three different paths 1,2 and 3 are W_1, W_2 and W_3 respectively , then



A. $W_1 > W_2 > W_3$

B. $W_1 = W_2 = W_3$

C. $W_1 < W_2 < W_3$

D. $W_2 > W_1 > W_3$

Answer: B

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25. Find the magnitude of the magnetic field at the center of an equilateral triangular loop of side length 1m which is carrying a current of 10A. (Take $\mu_0 = 4\pi \times 10^{-7} NA^{-2}$)

A. $18\mu T$

B. $1\mu T$

C. $9\mu T$

D. $3\mu T$

Answer: A

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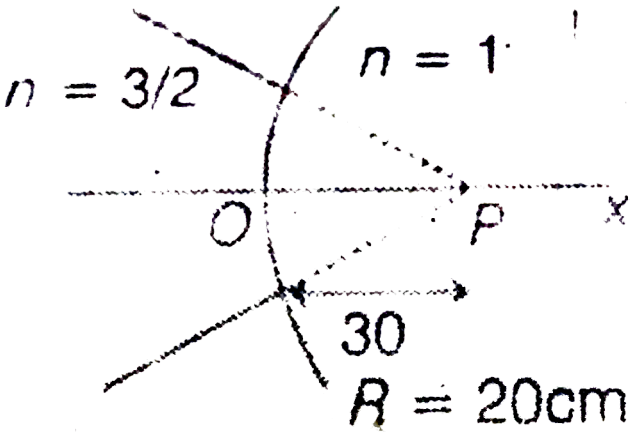
26. The image for the converging beam after refraction through the curved surface is

formed at



A. x= 40 cm

B. $x = \frac{40}{3}cm$

C. $x = -\frac{40}{3}cm$

D. $x = \frac{180}{7}cm$

Answer: A

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27. A point object is moving with velocity $v_0 = 2\hat{i} - 3\hat{j} + 4\hat{k}$ in front of a moving plane mirror whose normal is along x - axis.The mirror is moving with velocity $v_m = \hat{i} - 4\hat{j} + 2\hat{k}$. Find the velocity vector of image

A. $-5\hat{j}$

B. $-3\hat{j} + 4\hat{k}$

C. $-4\hat{j} + 2\hat{k}$

D. $2\hat{i} - 3\hat{j} + 2\hat{k}$

Answer: B

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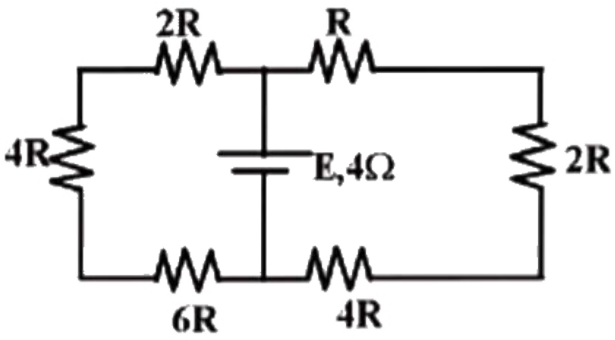
28. A battery of internal resistance 4Ω is connected to the network of the resistance as shown in figure. To deliver maximum power to the network, the magnitude of resistance R in

Ω should be $\frac{x}{21}$. Find x .



A. 16

B. 17

C. 19

D. 23

Answer: C

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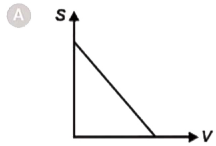
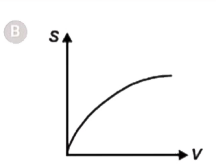
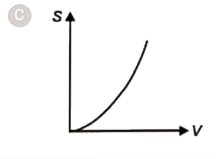
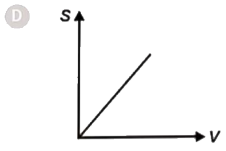
29. The displacement (s)- velocity (v) graph of a particle if it starts moving from rest with a uniform acceleration which is parallel to its instantaneous direction of motion is

A. 

B. 

C. 

D. 

Answer: C

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30. A very broad elevator is going up vertically with a constant acceleration of $2m/s^2$. At the instant when its velocity is $4m/s$ a ball is projected form the floor of the lift with a speed of $4m/s$ relative to the floor at an

elevation of 30°. Time taken by the ball to return the floor is $(g = 10ms^2)$

A. $\frac{1}{2}S$

B. $\frac{1}{3}S$

C. $\frac{1}{4}S$

D. 1S

Answer: B

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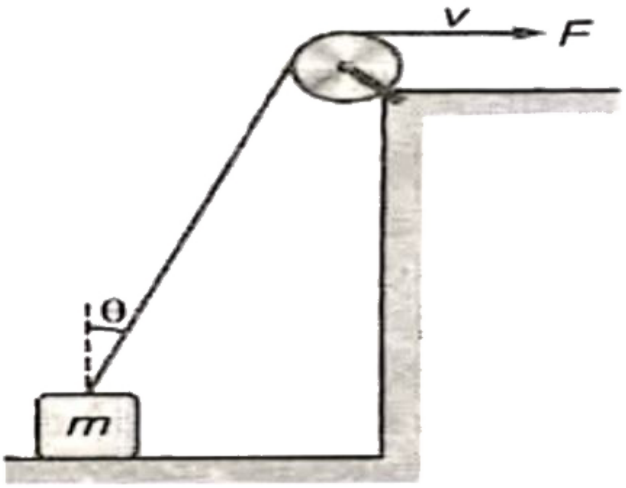
31. If A block is dragged on a smooth horizontal plane with the help of a light rope which moves with a velocity v as given in the figure .Then find the horizontal velocity of the block .



A. v

B. $v \sin \theta$

C. $\frac{v}{\sin \theta}$

D. $\frac{v}{\cos \theta}$

Answer: C

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32. A particle at the end of a spring executes simple harmonic motion with a period t_1 while the corresponding period for another spring

is t_2 if the oscillation with the two springs in series is T then

A. $T = t_1 + t_2$

B. $T^2 = t_1^2 + t_2^2$

C. $T^{-1} = t_1^{-1} + t_2^{-1}$

D. $T^{-2} = t_1^{-2} + t_2^{-2}$

Answer: B

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33. Find the resultant amplitude of the following simple harmonic equations :

$x_1 = 5 \sin \omega t$

$x_2 = 5 \sin(\omega t + 53^\circ)$

$x_3 = -10 \cos \omega t$

A. 5

B. 10

C. 15

D. 20

Answer: B

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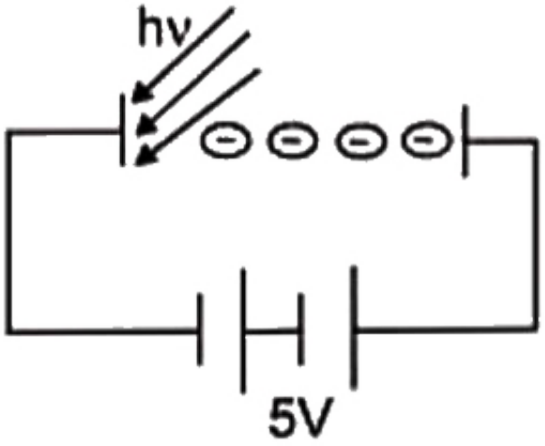
34. A monochromatic ray of photons of energy 5 eV are incident on cathode. Electrons reaching the anode have kinetic energyies varying from 6 eV to 8eV.Choose the correct

option.



A. work function of the metal is 1eV

B. work function of the metal is 3eV

C. current in the circuit is equal to saturation value

D. current in the circuit is less than saturation value.

Answer: D

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35. What is the reason behind the disturbing of incoming and reflected signals when a low flying aircraft passes overhead, which results in slight shaking of the picture on our TV screen ?

A. interference

B. diffraction

C. polarisation of direct signal

D. both (b) and (c)

Answer: A

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36. By what factor does the de-Broglie wavelength of a free electron changes if its kinetic energy is doubled ?

A. $\frac{1}{2}$

B. 2

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: C

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37. There is a circular hole of diameter $d = 140\mu m$ at the bottom of a vessel containing mercury . The minimum height of

mercury layer so that the mercury will not flow out of this hole is

(Surface tension, $\sigma = 490 \times 10^{-3} Nm^{-1}$)

A. 1.03 mm

B. 1.53mm

C. 1.03 mm

D. 1.53cm

Answer: A

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38. Water drains out of a vessel filled with water upto height h through a hole of area A in t seconds.If the height of the water is 4 h then how much time will be required for the water to drain out ?[Assume $A << A_0$ (area of tank)]

A. t seconds

B. 4 t second

C. 2 t seconds

D. $\frac{t}{4}$ seconds

Answer: C

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39. An N-P-N transistor in a common emitter mode is used as a simple voltage amplifier with a collecter current of 4mA. The terminal of a 8 V battery is connected to the collector through a load ressitance R_L and to the base through a resistance R_B. The collector-emitter voltage $V_{CE} = 4V$ base -emitter voltage $V_{BE} = 0.6V$ and base current amplification

factor $\beta_{d.c.} = 100$.Find the values of R_L and R_B.

A. $R_L = 1k\Omega, R_B = 185k\Omega$

B. $R_L = 2k\Omega, R_B = 150k\Omega$

C. $R_L = 1k\Omega, R_B = 240k\Omega$

D. $R_L = 3k\Omega, R_B = 185k\Omega$

Answer: A

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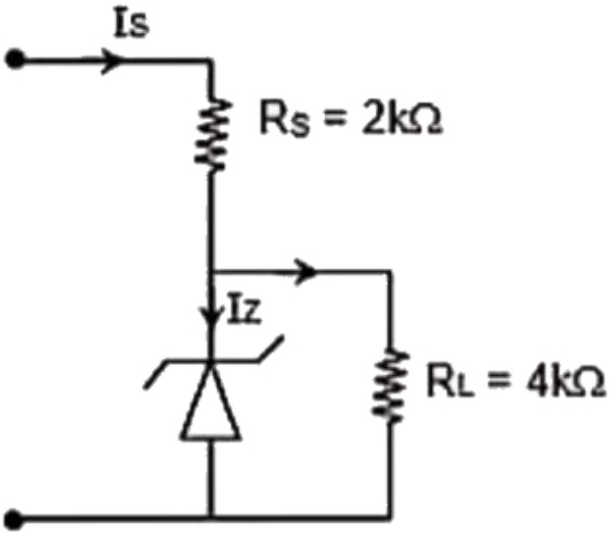
40. In the figure there is a DC voltage regulator circuit, with a Zener breakdown voltage = 6V.If the unregulated input voltage varies between 10V to 16V,then what is the maximum Zener current?



A. 1.5mA

B. 7.5mA

C. 3.5mA

D. 2.5 mA

Answer: C

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41. The equation of a wave on a string of linear mass density $0.04kgm^{-1}$ is given by

$$y = 0.02(m)\sin\left[2\pi\left(\frac{t}{0.04(s)} - \frac{x}{0.50(m)}\right)\right].$$

The tension in the string is :

A. 4.0 N

B. 12.5 N

C. 0.25 N

D. 6.25N

Answer: D

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42. There is a leak proof cylinder of length 1m,made of a metal that has very low coefficient of expansion is floating vertically in water at $0^\circ C$ such that its height above the water surface is 20cm. If the temperature of water is increased to $4^\circ C$, the height of the cylinder above the water surface becomes 21 cm. The density of water at $T = 4^\circ C$, relative to the density at $T = 0^\circ C$ is approximately

A. 1.03

B. 1.04

C. 1.26

D. 1.01

Answer: D

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43. In Young's double slit experiment a mica plate of refractive index μ is introduced in the path of light coming from one of the slit . If the central bright frige gets shifted to the point originally occupied by the fourth bright

fringe, then the thickness of the mica plate will be (symbols have their usual meaning)

A. $\frac{2\lambda}{(\mu-1)}$

B. $\frac{4\lambda}{3(\mu-1)}$

C. $\frac{4\lambda}{(\mu-1)}$

D. $\frac{2\lambda}{3(\mu-1)}$

Answer: C

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44. A 10 kg stone is suspended with a rope of breaking strength 30 kg-wt. The minimum time in which the stone can be raised through a height 10 m starting from rest is (Take, $g = 10Nkg^{-1}$).

A. 0.5s

B. 1.0s

C. $\sqrt{\frac{2}{3}}s$

D. 2.0s

Answer: B

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45. On which principle does sonometer work ?

A. Hooke's law

B. Elasticity

C. Resonance

D. Newton's law

Answer: C

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